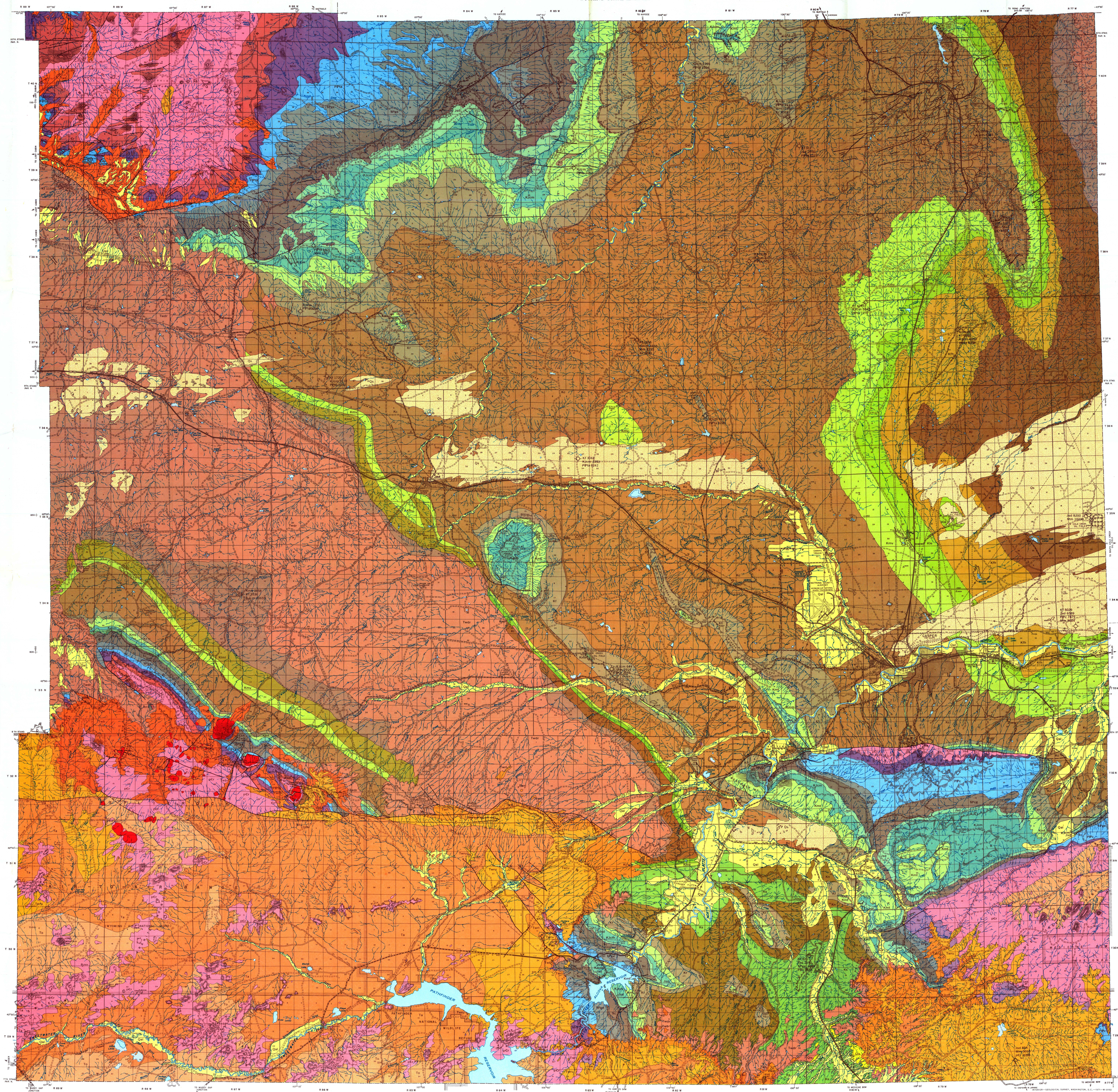
UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE
WYOMING STATE ENGINEER

GENERALIZED SECTION OF THE GEOLOGIC FORMATIONS AND THEIR WATER-BEARING CHARACTERISTICS IN NATRONA COUNTY, WYO.

ERA	SYSTEM	SERIES	SUBDIVISION AND THICKNESS, IN FEET	WATER SUPPLY	ROCK UNIT
CENOZOIC	QUATERNARY		Windblown deposits 0–40+	Will yield a maximum of 5–10 gpm of water to wells; the total dissolved-solids content of the water will range from about 500 to 2,500 mg/l.	Unconsolidated continental
			Landslide deposits	Will yield small supplies to springs and seeps; not a good site to drill a well.	
			Alluvium 0–190	Yields up to 1,300 gpm to wells, but yield depends on saturated thickness and grain size, which vary markedly; total dissolved-solids content of the water ranges from 246 to 8,240 mg/l.	
	TERTIARY	Pliocene	Ogallala Formation 0–800(?)	Will probably yield more than 200 gpm from conglomerate and zones of secondary permeability in some areas; the Arikaree will yield more than 200 gpm nearly everywhere there is 500 feet of saturated formation; smaller yields are readily available in most of the area underlain by these rocks; total dissolved-solids content of the water, at depths sampled, is generally less than 500 mg/l.	Consolidated continental: Postorogenic subunit
		Miocene	Arikaree Formation 0–1000		
		Oligocene	White River Formation: Upper member 0–600		
			White River Formation: Lower member 0–865		
		Eocene	Wagon Bed Formation 0–1000; Intrusive and extrusive rocks	Yields from intrusive and extrusive rocks generally less than 5 gpm.	Igneous and metamorphic
			Wind River Formation 0–7000	Yields mostly less than 10 gpm although larger supplies may be possible from conglomerate or large saturated thicknesses. Quality of water ranges from good for domestic use to unfit for stock use.	Consolidated continental: Orogenic subunit
		Paleocene	Fort Union Formation (Wind River Basin) 0–8000; Upper and lower members combined (Powder River Basin) 0–3000		
MESOZOIC	CRETACEOUS	Upper Cretaceous	Lance Formation 0–5000		
			Fox Hills Sandstone 0–700		Marine and continental
			Meeteetse Formation 400–630 / Lewis Shale 0–550	Water-supply characteristics same as for orogenic subunit (above)	Orogenic subunit; Consolidated continental
			Mesaverde Formation: Teapot Sandstone Member 50–115	Sandstone beds in the Fox Hills, Mesaverde, and Frontier Formations in most places will yield no more than 50 gpm; sandstones in other formations will yield much less. The quality of the water is poor; total dissolved solids are in excess of 1,000 mg/l nearly everywhere.	Marine and continental
			Mesaverde Formation: Unnamed middle member 260–750		
			Mesaverde Formation: Parkman Sandstone Member 50–500		
			Steele Shale / Niobrara Formation; Cody Shale 3000–5000		
			Wall Creek Sandstone Member / Frontier Formation 650–900		
		Lower Cretaceous	Mowry Shale 200–300		
			Muddy Sandstone Member / Thermopolis Shale 200		
			Cloverly Formation 150–300	Generally will yield 5–20 gpm to wells, but yields of as much as 250 gpm are obtained. Total dissolved-solids concentration ranges from as low as 70 mg/l to as great as 1,780 mg/l and may be much higher in parts of the area.	Continental and marine
	JURASSIC	Upper Jurassic	Morrison Formation 150	Will yield only small supplies in most areas.	
			Sundance Formation 300		
	JURASSIC(?) AND TRIASSIC(?)		Bell Springs Member of the Nugget Sandstone 0–90		
	TRIASSIC		Chugwater Group: Jelm Formation 25–185	Yields only small supplies of water. Water from the Goose Egg is generally poor quality.	
			Chugwater Group: Alcova Limestone 10–20		
			Chugwater Group: Red Peak Formation 600–700		
		Lower Triassic	Goose Egg Formation 150–380		
PALEOZOIC	PERMIAN		Casper Formation 0–500: Tensleep Sandstone 0–500	Capable of yields in excess of 4,000 gpm from zones of high secondary permeability in sandstone and limestone beds; sandstone would yield much smaller (50 gpm) supplies nearly everywhere; total dissolved-solids content would be less than 500 mg/l near the outcrop but the quality would deteriorate with increased distance from recharge area.	Marine
	CARBONIFEROUS: PENNSYLVANIAN		Amsden Formation 0–200		
	CARBONIFEROUS: MISSISSIPPIAN		Madison Limestone 200–400		
	CAMBRIAN		Cambrian rocks, undivided 0–900		
PRECAMBRIAN			Precambrian rocks	Yields generally are less than 5 gpm; total dissolved-solids content less than 500 mg/l.	Igneous and metamorphic



EXPLANATION

QUATERNARY (Pleistocene and Holocene)

- Qal — Alluvial deposits. *Unconsolidated silt, sand, and gravel*
- Qs — Windblown deposits. *Unconsolidated sand*
- Qls — Landslide deposits

TERTIARY

- To — Ogallala Formation (Pliocene; Upper Miocene and Pliocene). *Heterogeneous deposits of silt, sand, and gravel; may be unconsolidated or well cemented. In some areas, may include thin deposits of sand and gravel of Pleistocene age, which on lithologic criteria cannot be separated from the Ogallala Formation*
- Ta — Arikaree Formation (Lower Miocene). *Light-gray sandstone, fine- to medium-grained; contains some thin beds of limestone, tuff, and conglomerate*
- Twr, Twru, Twrl — White River Formation (Oligocene). Twru, *upper member is predominantly sandstone and conglomerate*; Twrl, *lower member is pinkish-gray siltstone containing minor conglomerate lenses*
- Twb — Wagon Bed Formation (Middle and upper Eocene). *Bentonitic mudstone, sandstone, and conglomerate*
- Ti — Intrusive and extrusive rocks
- Twdr — Wind River Formation (Lower Eocene). *Variegated claystone and shale, brown and gray sandstone, and lenticular conglomerate*
- Tfu, Tfuu, Tful — Fort Union Formation (Paleocene). *Wind River Basin: Shotgun Member consists of very fine grained sandstone and siltstone; Waltman Shale Member consists of silty and shaly claystone with a few thin beds of sandstone; unnamed lower member consists of fine- to coarse-grained sandstone, very fine grained sandstone, and siltstone. Powder River Basin:* Tfuu, *upper member consists of sandstone, siltstone, carbonaceous shale, and coal;* Tful, *lower member consists of claystone and siltstone interbedded with sandstone; carbonaceous material less abundant*

CRETACEOUS

Upper Cretaceous:

- Kl — Lance Formation. *Brown and gray sandstone and shale; thin coal and carbonaceous shale beds*
- Kfh — Fox Hills Sandstone. *Light-colored sandstone and gray sandy shale*
- Kle — Lewis Shale. *Gray sandy shale and lenticular sandstone*
- Kml — Meeteetse Formation and Lewis Shale. *Meeteetse Formation consists of gray carbonaceous shale interbedded with sandstone and thin coal beds*
- Klml — Lance, Lewis, and Meeteetse Formations
- Kmv — Mesaverde Formation. *Gray and brown massive to thin-bedded sandstone, and carbonaceous shale and coal beds; Teapot Sandstone Member at top; unnamed middle member; Parkman Sandstone Member at base*
- Ks — Steele Shale. *Gray shale with numerous bentonite beds and thick lenticular sandstones*
- Kn — Niobrara Formation. *Light-gray limestone and gray to yellow, speckled limy shale*
- Kc — Cody Shale. *Gray soft shale and lenticular sandstone beds; gray limy shale at base; Sussex Sandstone Member about 400 feet above Shannon Sandstone Member; Shannon Sandstone Member about 2,000 feet above base*
- Kf — Frontier Formation. *Gray thick sandstone beds in upper part; lower part contains black shale and white bentonite interbedded with sandstone*

Lower Cretaceous:

- Kmt — Mowry and Thermopolis Shales. *Mowry Shale is black and gray, weathers silvery gray, is hard, contains thin bentonite beds. Thermopolis Shale is black and soft; Muddy Sandstone Member 150–250 feet above base*

CRETACEOUS / JURASSIC

- KJcm — Cloverly and Morrison Formations. *Cloverly Formation is light-gray sandstone and lenticular conglomerate interbedded with variegated bentonitic claystone; Morrison Formation is variegated claystone and gray silty sandstone lenses*

JURASSIC (Upper Jurassic)

- Jsd — Sundance Formation. *Olive-gray shale and sandstone; persistent thin-bedded sandstone at base*

TRIASSIC(?) (Upper Triassic(?))

- JŦsn — Sundance Formation and Bell Springs Member of Nugget Sandstone. *Triassic(?) Bell Springs Member consists of very fine grained sandstone and pale red siltstone beds*

TRIASSIC

- Ŧc — Chugwater Group. *Includes: Jelm Formation at top is red sandstone and siltstone; Alcova Limestone in middle is gray laminated limestone; and Red Peak Formation at base is red shale and siltstone*
- ŦPge — Goose Egg Formation. *Red shale, gray dolomite and limestone, and anhydrite and gypsum beds*
- ŦPcg — Chugwater Group and Goose Egg Formation

PERMIAN, PENNSYLVANIAN, MISSISSIPPIAN (CARBONIFEROUS)

- PIPta — Tensleep Sandstone and Amsden Formation. *Massive tan clean sandstone underlain by thin-bedded cherty dolomite and limestone and red shale; red to gray sandstone at base may be the Upper Mississippian Darwin Sandstone Member*
- PIPc — Casper Formation. *Gray and tan thick-bedded sandstone underlain by interbedded sandstone, pink and gray limestone and dolomite, and red shale; red to gray sandstone at base*
- Mm — Madison Limestone. *Gray massive cavernous cherty limestone and dolomite*
- €r — Cambrian rocks. *Thin glauconitic shale interbedded with limy shale in upper part; dull pink quartzite and sandstone in lower part*
- Pzr — Paleozoic rocks. *Casper, Tensleep, Amsden, and Madison Formations, and Cambrian rocks, undivided*
- p€r — Precambrian igneous and metamorphic rocks

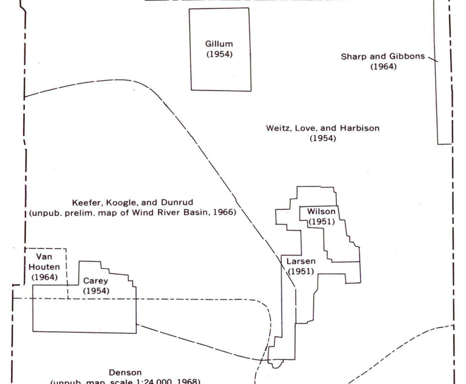
Contact
Dashed where approximately located

Fault
Dashed where approximately located; dotted where concealed. U, upthrown side; D, downthrown side

Mappable sandstone bed, in Cody Shale

A——A′
Location of section

KJcm 4365
Oil test
Number is depth to top of selected geologic map unit, in feet below land surface. Data from Petroleum Information completion cards



INDEX SHOWING SOURCE OF GEOLOGIC DATA

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SCALE 1:125 000

2 0 2 4 6 8 10 MILES
2 0 2 4 6 8 10 KILOMETERS

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D.C.—1971—W 69192

Geology compiled by Marlin E. Lowry, 1968. Adapted from published and unpublished sources indicated on index map

GEOLOGIC MAP OF NATRONA COUNTY, WYOMING